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L3: Entry 8 of 8

File: USPT

Aug 23, 1988

DOCUMENT-IDENTIFIER: US 4766577 A

TITLE: Axial borehole televiewer

BSPR:

The sub-chassis, preferably driven by and in response to rotation of the main chassis, orients the transducer to point substantially longitudinally along the borehole. In addition, the sub-chassis causes the transducer to move in a manner which scans across an entire transverse section of the borehole. In the preferred embodiment, these movements are synchronized with the rotation of the main chassis, so that the transducer simultaneously orbits around the longitudinal axis of the housing while walking radially inwardly and outwardly across the bottom of the housing. This motion is accomplished while the transducer is emitting and receiving the sequence of acoustic pulses, the pulses thus being transmitted and received across the corresponding areal extent of the borehole.

BSPR:

In the preferred embodiment, the sub-chassis includes a self-reversing cam and follower drive which are coupled to the transducer. As the sub-chassis is rotated in its plane (which is perpendicular to the longitudinal axis of the housing) the cam and follower (a type of oscillating means) periodically moves the transducer radially back and forth inwardly and outwardly along an arcuate substantially radial line extending across the bottom of the housing from the axis of rotation of the sub-chassis to the outer edge thereof. In the preferred embodiment, the period of the oscillating means includes a plurality of rotations of the sub-chassis in its plane, so that the acoustical transducer thereby describes a spiral pattern inwardly and outwardly across the borehole as the acoustic pulses are emitted and reflected in the borehole. In the preferred embodiment, the transverse movements of the transducer on the sub-chassis are precisely correlated with the rotational movements thereof around the tool longitudinal axis, so that the precise position of the transducer at any given moment can be determined. By this means, the electronic signals produced in response to the transmission and reception of the emitted and reflected acoustic pulses can be easily correlated with the corresponding transverse section scan positions of the transducer. The electronic signals, being thereby associated with the corresponding physical scan positions, are then displayed. The displayed information may be recorded photographically or electronically, as may be desired.

DEPR:

With reference to the drawings, the new and improved axial borehole televiewer, and the method for axially logging a borehole therewith, according to the present invention, will be described. FIG. 1 shows an axial borehole televiewer system 10 including a downhole sonde in a housing 12 positioned in a borehole 14 filled with fluid 15. The sonde housing 12 is supported in borehole 14 by a conventional logging cable 17. Cable 17 provides both physical support for moving the sonde vertically within borehole 14, and also as a communications link between the electronics package 18 located in housing 12 and the surface electronics 19 located at the top of borehole 14. System 10 also includes a suitable display unit 21, such as a CRT display, and a recorder such as a video recorder 22.

CLPV:

performing said scanning across a transverse section of the borehole by simultaneously orbiting the transducer, on a sub-chassis within the housing, around the longitudinal axis of the housing and moving the transducer radially inwardly and outwardly across at least a portion of the bottom of the housing while the transducer is emitting and receiving the sequence of acoustic pulses,

to transmit and receive the pulses across the corresponding areal extent of the borehole, the sub-chassis being rotatably supported on the mounting means at the bottom of the housing for rotation substantially in a plane substantially perpendicular to the longitudinal axis of the housing, and for oscillating and moving the transducer, in response to said rotation thereof in the plane, radially inwardly and outwardly, the period of said oscillation including a plurality of rotations of the sub-chassis in the plane;

CLPV:

(c) performing said scanning across a transverse section of the borehole by simultaneously orbiting the transducer, on a sub-chassis within the housing, around the longitudinal axis of the housing and walking the transducer radially inwardly and outwardly across the bottom of the housing while the transducer is emitting and receiving the sequence of acoustic pulses, to transmit and receive the pulses across the corresponding areal extent of the borehole, the sub-chassis being rotatably supported on the mounting means at the bottom of the housing for rotation substantially in a plane substantially perpendicular to the longitudinal axis of the housing, and for oscillating and moving the transducer, in response to the rotation thereof in the plane, periodically radially back and forth inwardly and outwardly along an arcuate substantially radial line extending across the bottom of the housing from the axis of rotation of the sub-chassis to the outer edge thereof, the period of said oscillation including a plurality of rotations of the sub-chassis in the plane, the acoustical transducer thereby describing a spiral pattern across the borehole as the acoustic pulses are emitted and reflected in the borehole,

CLPX:

(c) oscillating means coupled to said drive means for moving said transducer, in response to said rotation thereof in said plane, periodically radially back and forth inwardly and outwardly along an arcuate substantially radial line extending across the bottom of said housing from the axis of rotation of said sub-chassis to the outer edge thereof, the period of said oscillating means including a plurality of rotations of said sub-chassis in said plane, said acoustical transducer thereby describing a spiral pattern across the borehole as said acoustic pulses are emitted and reflected in the borehole,

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- ☐ 1. Document ID: US 5771984 A Relevance Rank: 99

L3: Entry 1 of 8

File: USPT

Jun 30, 1998

US-PAT-NO: 5771984

DOCUMENT-IDENTIFIER: US 5771984 A

TITLE: Continuous drilling of vertical boreholes by thermal processes:
including rock spallation and fusion

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw. Desc	Image
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- ☐ 2. Document ID: US 4774573 A Relevance Rank: 72

L3: Entry 7 of 8

File: USPT

Sep 27, 1988

US-PAT-NO: 4774573

DOCUMENT-IDENTIFIER: US 4774573 A

TITLE: Method and apparatus for generating a video display from signals
produced by borehole scanning

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw. Desc	Image
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- ☐ 3. Document ID: US 4766577 A Relevance Rank: 71

L3: Entry 8 of 8

File: USPT

Aug 23, 1988

US-PAT-NO: 4766577

DOCUMENT-IDENTIFIER: US 4766577 A

TITLE: Axial borehole televiewer

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw. Desc	Image
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- ☐ 4. Document ID: US 4837753 A Relevance Rank: 70

L3: Entry 4 of 8

File: USPT

Jun 6, 1989

US-PAT-NO: 4837753
DOCUMENT-IDENTIFIER: US 4837753 A
TITLE: Method and apparatus for logging a borehole

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw Desc	Image
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☐ 5. Document ID: US 4780862 A Relevance Rank: 54

L3: Entry 6 of 8 File: USPT Oct 25, 1988

US-PAT-NO: 4780862
DOCUMENT-IDENTIFIER: US 4780862 A
TITLE: Borehole televiwer

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw Desc	Image
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☐ 6. Document ID: US 4780858 A Relevance Rank: 54

L3: Entry 5 of 8 File: USPT Oct 25, 1988

US-PAT-NO: 4780858
DOCUMENT-IDENTIFIER: US 4780858 A
TITLE: Borehole televiwer mudcake monitor

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw Desc	Image
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☐ 7. Document ID: US 4855965 A Relevance Rank: 54

L3: Entry 3 of 8 File: USPT Aug 8, 1989

US-PAT-NO: 4855965
DOCUMENT-IDENTIFIER: US 4855965 A
TITLE: Time ramped gain for borehole televiwer

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWIC	Draw Desc	Image
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☐ 8. Document ID: US 5485745 A Relevance Rank: 52

L3: Entry 2 of 8 File: USPT Jan 23, 1996

US-PAT-NO: 5485745
DOCUMENT-IDENTIFIER: US 5485745 A
TITLE: Modular downhole inspection system for coiled tubing

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWC	Draw Desc	Image
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